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ORIGINAL ARTICLE

The implementation of a physical activity counseling program in rehabilitation care: findings from the ReSpAct study

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ABSTRACT

Purpose: This study aimed to evaluate the implementation of a physical activity counseling program in rehabilitation and to study heterogeneity in received counseling and investigate its association with changes in patients' physical activity outcomes.

Methods: This prospective cohort study was conducted in 18 rehabilitation institutions. Data were collected using surveys completed by professionals ($n = \pm 70$) and patients ($n = 1719$). Implementation was evaluated using different process outcomes: reach, dosage, satisfaction, maintenance. Patients' physical activity outcomes included changes in total minutes/week of physical activity. Latent class analyses were conducted to identify profiles of received counseling characteristics and multilevel models were used to investigate associations with physical activity outcomes.

Results: 5873 Patients were provided with motivational interviewing-based counseling after rehabilitation. Professionals and patients were positive about the program. Sixteen institutions (89%) formally agreed to continue the program. The four identified profiles of counseling characteristics illustrate a large variation in received counseling among patients. No substantial differences in physical activity outcomes were found between profiles.

Conclusion: After a three-year program period, the physical activity counseling centers were sustainably implemented in Dutch rehabilitation care. This study illustrated an innovative approach to assess heterogeneity in implementation outcomes (e.g., counseling profiles) in relation to program outcomes (e.g., physical activity).

➤ IMPLICATIONS FOR REHABILITATION

- Physical activity counseling after rehabilitation is important to support people with disabilities in making the step from rehabilitation-based physical activities to community-based physical activities.
- Establishing "Physical Activity Counseling Centers" is a promising "disability-overarching" strategy to promote physical activity after rehabilitation.
- Although the actual received counseling (dosage) varied among patients, this did not coincide with large differences in physical activity outcomes.
- The training in Motivational Interviewing, the financial incentives, and the advisory support were considered as important or essential ingredients for a successful implementation of the counseling program in rehabilitation practice.

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Introduction

Since physical activity levels remain lower in people with disabilities and/or chronic diseases compared to able bodied, promoting physical activity is of great importance for this heterogeneous population [1,2]. A large number of studies describe approaches or programs to promote physical activity among disabled persons [3–8]. Besides promotion in community settings, promotion in a rehabilitation setting has been proposed as an effective and sustainable strategy [9–11]. However, implementation of an evidence-informed program to promote physical activity in

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rehabilitation care does not occur spontaneously. Several factors may challenge successful implementation of a physical activity program in rehabilitation care.

Firstly, implementing a physical activity program in rehabilitation care can be complex due to the multidisciplinary setting and the heterogeneous target population [12,13]. Secondly, a program aiming to promote physical activity often consists of different aspects. In a heterogeneous setting such as rehabilitation, it may be a challenge to implement all aspects of the program according to the originally developed protocol, and this may subsequently influence patient-level outcomes [14]. Furthermore, the success of implementation and execution of a physical activity program in rehabilitation can change over time due to changes on both the patient- as well as on the professional and institutional level. For example, there may be changes related to the socio-political context (e.g., changes in health insurance), to the institutions (e.g., reorganizations) or to the professionals (e.g., changes in time available, workload) [15–18].

Since both the way a physical activity program is delivered by professionals and how it is received by patients are closely related to the outcomes of the program on patient level [14], it is of great importance to collect data at both levels when evaluating it. Several theoretical frameworks exist to guide the evaluation of implementation processes [19]. One example is the theoretical framework of Wierenga *et al.* [18] where several commonly used frameworks (e.g., RE-AIM) are combined into one framework [15,20–23]. This framework distinguishes three phases of introducing a program into daily practice; the adoption, implementation and continuation phase. Different process outcomes (e.g., reach, dosage, satisfaction) are defined for every phase to guide evaluation [18].

An example of an evaluation guided by this framework is the nationwide implementation of a physical activity program called "Rehabilitation, Sports and Exercise" (RSE) [24]. This evidence-informed program [10,11] aims to promote sports, physical activity, and active lifestyle in people with physical disabilities and/or chronic diseases during and after a rehabilitation treatment [24,25]. One part of the RSE program is including sports and physical activity as a standard component of the rehabilitation treatment. By doing so, patients have the opportunity, in a safe environment, to explore possibilities to be physically active and to get familiar with different types of activities. Another part of the RSE program includes providing patients with Motivational Interviewing (MI)-based counseling to develop and/or maintain an active lifestyle after rehabilitation treatment has finished. Since rehabilitation patients are recognized as a heterogeneous population, tailored counseling after rehabilitation is essential for realizing physical activity behavioral change and maintaining an active lifestyle [11]. Counseling sessions may help patients to make the step from physical activity in rehabilitation care to sustainable physical activity in the community [6,9,26].

To optimize connections between rehabilitation care and community-based physical activity across the country, a nationwide approach was developed to implement the RSE program (i.e., realize "Physical Activity Counseling Centers") [24]. The national coordinators and program owners, developed a multifaceted strategy to facilitate the implementation process in 18 rehabilitation institutions across the country. An independent research group collected detailed information on the way the program was implemented and executed in the participating rehabilitation institutions over time with the aim to explain why the RSE program was effective (or not) and thus aiding the further optimization of physical activity counseling after rehabilitation [24,25].

Therefore, the aims of this study were 1) to evaluate the implementation of a physical activity counseling program (i.e., the RSE program) in rehabilitation over a three-year period, 2) to study heterogeneity in received counseling, and 3) investigate if and how distinct counseling profiles are associated with changes in patients' physical activity outcomes. While the first aim may contribute to a better understanding of how rehabilitation professionals implemented and executed a physical activity counseling program in their rehabilitation institution, the second and third aims illustrate an innovate method to assess heterogeneity in "real-world" implementation data by creating profiles of received counseling characteristics at the patient level.

Materials and methods

Study design

This study is part of the "Rehabilitation, Sport and Active Lifestyle" (ReSpAct) study, a longitudinal cohort study on the RSE program executed in 18 institutions (12 rehabilitation centers and 6 rehabilitation departments of hospitals) across the Netherlands [24,25]. Since tailored counseling is a pivotal element of the RSE program [10,11], this study was specifically focused on the implementation of the "Physical Activity Counseling Centers" and its associations with short-term outcomes on patients' physical activity behavior. The process evaluation was guided by a theoretical framework [18] and based on commonly reported process outcomes [23], namely reach, dosage, fidelity (in MI), satisfaction, and maintenance. In addition, the construction of distinct profiles based on the counseling characteristics was used to gain insight into the implementation on patient level. Data were thus collected on the level of the institution (i.e., professionals) and the patient and through different methods (surveys, online registration system, logbooks).

Ethical considerations

The study was approved by the local ethics committee. The participating professionals and patients who are enrolled in the ReSpAct-study signed a (digital) informed consent. The study is registered by the Netherlands National Trial Registry: NTR3961.

The "rehabilitation, sports and exercise" program

The overarching goal of the RSE program is to promote an active lifestyle in persons with physical disabilities and/or chronic diseases receiving any kind of rehabilitation care by encouraging a physical activity behavioral change [24,25]. The full RSE program focuses both on integrating physical activity and sports during the rehabilitation treatment as well as on promoting an active lifestyle after discharge from rehabilitation. The former is achieved by integrating different physical activity and sports in the multidisciplinary rehabilitation program, while the latter is achieved by setting up "Physical Activity Counseling Centers" in which patients receive face-to-face consultation and tailored telephone-based counseling on active lifestyle after rehabilitation. The "Physical Activity Counseling Centers" are located within the rehabilitation institutions as the place (i.e., the room) from which the consultations and counseling sessions take place. The consultations and counseling sessions are offered by trained physical activity counselors and based on MI in order to realize a behavioral change [27]. Most physical activity counselors are also working as a physiotherapist or sport therapist in the rehabilitation treatment. The number of counselors per "Physical Activity Counseling

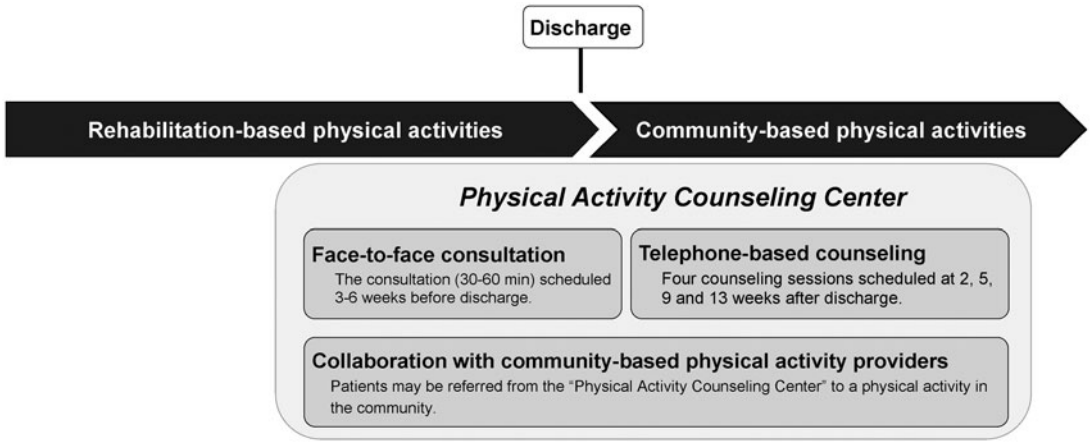

Figure 1. The elements of the "Physical Activity Counseling Center" as part of the implementation of the Rehabilitation, Sport and Exercise program.

Centers" and the number of operating hours vary among institutions. During the tailored guidance, patients can be referred from the "Physical Activity Counseling Center" to a community-based physical activity or sport provider. The counselors in the "Physical Activity Counseling Centers" are therefore the "connectors" between rehabilitation-based and community-based physical activity and sports. An overview of the RSE program and elements of the "Physical Activity Counseling Center" is given in Figure 1.

The 18 participating institutions received support to implement the program during a three-year period (i.e., a multifaceted implementation strategy). The support consisted of the following aspects:

- Financial incentive: every institution received a fixed amount of money every year.
- National ($n = 5$) and regional ($n = 8$) meetings with involved rehabilitation professionals of all participating institutions were organized to share knowledge and experiences throughout the program period.
- Advisory support and visits from national coordinators.
- Promotion and support material: institutions received a wide range of different materials to promote the "Physical Activity Counseling Center" (e.g., posters, banners) and to facilitate the implementation process (e.g., a Handbook with guidelines).
- Training in MI: all counselors received a three-day training course in MI by a certified MI trainer including several refresh training sessions.
- Feedback on project plans, annual plans, and annual reports: each institution handed in a project plan, three annual plans, and three annual reports to the program coordinators, who provided feedback on the documents.

A detailed description of the content of the RSE program and the implementation strategy can be found elsewhere [24,25].

Setting and study population

Twelve rehabilitation centers and six rehabilitation departments of hospitals were selected to participate in this study. Before the implementation process started, participating institutions declared that they were willing to implement and continue the RSE program in their institution.

Two national coordinators developed and executed the implementation of the RSE program in Dutch rehabilitation care following the work of van der Ploeg et al. [11]. Logs from the national coordinators were used to obtain information about the implementation process on a national level. Rehabilitation professionals (managers, physicians, project leaders, counselors) in each of the 18 rehabilitation institutions provided information about the implementation of the "Physical Activity Counseling Center" on an institutional level. Information on patient level was obtained via logs from counselors registered in a custom-made online system and by survey forms filled in by patients who gave informed consent to take part in the ReSpAct-study [25]. When no information (i.e., missing data) about a session was registered in the system by the counsellors, we assumed that this session did not take place.

Process outcomes

Table 1 presents an overview of the descriptions of the process outcomes on different levels (institutional and patient) and the corresponding measurement-instruments (logbooks, online registration system, surveys).

Reach

At institutional and professional level, the response rates to the meetings, organized as part of the implementation strategy, were determined using logbooks of the national coordinators. In addition, the "reach" comprised the number of locations, professionals and patients involved in the implementation of the RSE program using a custom-made online registration system. The development of this registration system allowed us to collect anonymous data on the number and type of patients that received support via one of the "Physical Activity Counseling Centers." Counselors were instructed to complete an online record after each face-to-face consultation, which included information about patient's characteristics (gender, year of birth, disability or disease, rehabilitation treatment). Registrations took place between April 2013 and December 2015.

The number of patients participating in the RSE program was calculated per institution and clustered for each half year of the program period. This resulted in five periods (period 1: July–December 2013, period 2: January–June 2014, period 3: July–December 2014, period 4: January–June 2015, period 5: July–December 2015). Variations in patients' characteristics per year are presented. Furthermore, the reach outcome included the percentage of patients participated in the RSE program relative to the total number of patients that received rehabilitation treatment within each rehabilitation institution yearly.

Table 1. Description of the process outcomes.

Process outcomes	Description	Measuring instruments
Reach	Institutional and professional level • Number of locations with an active PA Counseling Center • Number of professionals involved in the implementation process	LB, RS
	Patient level • Total number of patients participated in the RSE program • Percentage of patients participated in the RSE program (nominator) relative to the total number of patients that received rehabilitation treatment within each institution (de-nominator) yearly*	RS, aQS
Dosage	Institutional and professional level • Number of and response rates to national and regional meetings organized by national coordinators • Number of training courses in MI	LB
	Patient level • Percentage of patients that received a referral to a community-based sport or PA during the face-to-face consultation at the "PA Counseling Center"** • Number of counseling sessions received by patients (phone and email contact)**	RS
Fidelity in MI	Patient level • Patient's assessment*** of the extent to which the received face-to-face consultation and counseling sessions were based on MI	QSp (t0 + t1)
Satisfaction	Professional level • Professionals' opinion about activities related to implementation strategy • Professionals' opinion about the RSE program	QS
	Patient level • Patients' opinion about the received face-to-face consultation and counseling from the counselor of the "PA Counseling Center"	QSp (t0 + t1)
Maintenance	Institutional level • The number of institutions that became a paid member of the RSE program after the program period**** • Number of locations with an official "PA Counseling Center" 5 months after program period	LB

Note. Description of the process outcomes are based on definitions by [22,23].
*Eight rehabilitation institutions were not able to provide information on the total number of patients that received rehabilitation treatment within their institution (de-nominator). Therefore, the percentage data of the reach was calculated from 10 institutions instead of 18.
**Dosage outcome on patient level is assessed among patients that are enrolled in the ReSpAct-study.
***The MICAS-questionnaire was used to assess MI fidelity at patient level. ****Institutions that became paid member of RSE program officially declared that they would continue the "PA Counseling Center" after the program period. Official "PA Counseling Centers" should be a paid member of the RSE program.
PA: Physical activity; LB: Logbook by national coordinators; RS: Registration system; aQS: An additional questionnaire was sent to each institution to obtain information about the total number of patients that received a rehabilitation treatment each year. Total numbers were available from ten institutions; QS: Questionnaires from professionals at three time points (T0, T1, T2); QSp: Questionnaires from patients at two time points (t0, t1).

Dosage

At patient level, the dosage outcomes included the percentage of patients receiving a referral to a community-based sport or physical activity and the number of counseling sessions received by patients. Counselors were asked to register in the online registration system the date, duration, and mode of each consultation between counselor and patients who gave informed consent to take part in the ReSpAct-study. Counselors were also asked to register whether or not the patients received a referral to a community-based sport or physical activity. Based on the registration in the online registration system, the total number of counseling sessions (email and phone sessions) received by patients was calculated. The dosage outcome was only calculated for patients who gave informed consent to take part in the ReSpAct-study.

Fidelity of MI

In this study, the "fidelity" outcome was specifically focusing on the application of MI, as MI was assumed to be one of the important working mechanism of the consultations with counselors [25]. The MI fidelity may give an indication of the quality of the consultations (face-to-face and telephone-based) from a patient perspective. At patient level, the MI fidelity was assessed by using the "evaluation of an MI Consultation on Active lifestyle and Sports (MICAS)" questionnaire and is described in detail in this journal [28]. The MICAS is a 20-item questionnaire developed to evaluate MI fidelity based on patient's experiences. The outcome of the questionnaire is a MICAS-score, which ranges from 20 (low MI fidelity) to 100 (high MI fidelity). The MICAS was filled out by patients who were enrolled in the linked ReSpAct-study at two moments in time. The baseline survey (t0) took place immediately after the face-to-face consultation and the follow-up survey (t1) took place 1 week after the counseling period (i.e., 14 weeks after discharge from rehabilitation). The MICAS-score of the t0-survey assessed MI fidelity of the face-to-face consultation, while the MICAS-score of the t1-survey assessed MI fidelity of the counseling sessions.

Satisfaction

At the institutional level, the "satisfaction" outcome was used to gain more insight into professionals' opinion about the RSE program and the activities of the implementation strategy (e.g., meetings, training in MI) using survey data. These surveys were conducted among rehabilitation professionals involved in the implementation of the RSE program in one of the participating institutions at three moments in time (T0: April 2013, T1: June 2014, T2: September 2015). At each time point, professionals were asked to rate the RSE program on a 10-points scale in which higher scores reflected a more positive opinion about the RSE program. The last survey (T2) included also questions about professionals' experiences with the implementation strategy.

In addition, the patients' opinion about the received face-to-face consultation and counseling sessions was assessed using survey data of patients enrolled in the ReSpAct-study. Patients were asked to rate the received face-to-face consultation (at t0) and counseling sessions (at t1) on a 10-points scale, in which a 10 indicated that patients were highly satisfied with the received guidance.

Maintenance

On institutional level, the "maintenance" outcome provided an indication of the likelihood of continuation of the RSE program after the program period using the logbooks of the national coordinators. These logbooks included the number of institutions that became "member" of RSE program and therefore formally committed to continue the "Physical Activity Counseling Center" after the program period. Lastly, the national coordinators provided information about the number of "Physical Activity Counseling Centers" 5 months after the end of the program period.

Physical activity outcomes

Level of daily physical activity was assessed with an adapted version of The Short Questionnaire to Assess Health – Enhancing Physical Activity (SQUASH) [29]. Patients participating in the ReSpAct-study completed the adapted version of the SQUASH at baseline (t0) and at the follow-up (t1) measurement. The baseline and follow-up measurements took place respectively, 3 till 6 weeks before discharge and 14 weeks after discharge from rehabilitation. The SQUASH questionnaire was completed on paper or online. The SQUASH is a self-report recall questionnaire to assess daily PA of healthy adults based on an average week in the past month. Some minor changes were made to make the SQUASH applicable for people with a physical disability [25]. The original SQUASH has proven to be reliable and valid. Two variables were calculated for our analyses; 1) total minutes of physical activity (continuous variable), 2) whether or not the patients participated in sports activities (yes/no). Sport activities executed as part of the rehabilitation treatment were excluded here. All available physical activity data were included in the multilevel analyses.

Covariates

Motivation for engaging in an active lifestyle was assessed by the Behaviour Regulation in Exercise Questionnaire (BREQ-2) [30]. The BREQ-2 consists of 19 statements on a five-point Likert scale and has demonstrated strong factorial validity in participants of exercise programs. Self-efficacy was assessed with a seven-item questionnaire based on [31,32]. Counselors registered general information (e.g., gender, age, treatment setting) about the patients in the online registration system.

Statistical analyses

Data of all process outcomes were described using appropriate descriptive statistics [e.g., means, standard deviations (SD), medians, interquartile ranges (IQR), or percentages]. Chi-squared tests were performed to investigate differences between characteristics (age, gender, rehabilitation treatment, setting, diagnose) of patients who are reached in the first (2013), second (2014), and last (2015) year of the program period (change in reach outcome). A Wilcoxon signed-rank test was conducted to determine if the MICAS-scores were significantly different between the t0- and t1-survey (MI fidelity from patient's perspective).

To better understand the heterogeneity of received counseling on the patient's level, distinct profiles of received counseling were identified using latent class analyses (LCA). LCA is a recognized type of cluster analysis used to group patients in k number of unique (otherwise observed) categories (i.e., profiles), where within each category patients are most similar regarding the received counseling and most different between identified categories. Profiles were constructed based on the following counseling characteristics; number of telephone-based contacts, number of email-based contacts, whether or not people were referred to a sport or exercise activity in the community and total duration of contacts. To find the optimal number of profiles, a 1–6 class solution was modelled and multiple model fit criteria were assessed and compared according to common procedures described elsewhere [33]. After the optimal number of profiles was chosen, each profile was labelled according to salient characteristics of which detailed information is reported in the Supplementary Material.

Next, multilevel analyses were conducted to analyze associations between profile membership and changes in physical activity outcomes during and after rehabilitation, in order to assess heterogeneity in "real-world" implementation data at the patient level. A three-level model was used in which time (level 1) was clustered within patients (level 2) and patients were clustered within institutions (level 3). The largest profile was used as the reference category. Possible interactions between profile membership and time were investigated first to assess differences in changes in physical activity outcomes over time between the profiles. The crude models included the profile membership dummy variables and interaction terms. The adjusted models included covariates, age, gender, treatment setting (center or hospital), motivation at baseline, and self-efficacy scores at baseline. Results of these analyses are presented as regression coefficients or odds ratios and corresponding 95% confidence intervals. Analyses were performed using Mplus 7.11, Muthen & Muthen (www.statmodel.com), MLwiN version 2.36 (University of Bristol, United Kingdom) and SPSS version 20.0 (SPSS Inc., Chicago, IL).

Results

Reach

Institutional and professional level

A total of 26 "Physical Activity Counseling Centers" were set up by one of the 18 participating institutions, indicating that some institutions established "Physical Activity Counseling Centers" at different locations. The number of professionals involved in the implementation process and their responses to the surveys are shown in Supplementary Table S1.

Patient level

5873 Patients (92% adults) participated in the RSE program. Figure 2 shows the total number of patients for every half year of the program period. In 15 of the 18 organizations (83%) this number of patients declined in the last half year of the program period. As a result, the total number of participants was the lowest in this last period (Figure 2). In the second and third year of the program period, the percentage of the patients that participated in the RSE program relative to the total number of patients that received rehabilitation treatment ranged respectively between 1–23% (mean: 8%, $N = 10$ institutions) and 2–22% (mean: 7%, $N = 10$ institutions). In the majority of the institutions, 1–5% of the patients that received rehabilitation treatment participated in the RSE program. Two institutions (a rehabilitation department and rehabilitation center) reached >15% of their patients.

Characteristics of patients (age, rehabilitation treatment, setting, diagnose) reached by the RSE program varied among each year of the program period ($p < 0.05$, see Supplementary Material). During the program period, the relative number of adolescents increased [$X^2(6) = 15.945$, $p = 0.014$]. In addition, compared to the first year of the program period the percentage of patients reached within a rehabilitation department of a hospital increased over time [X^2 $(2) = 33.640$, $p < 0.001$].

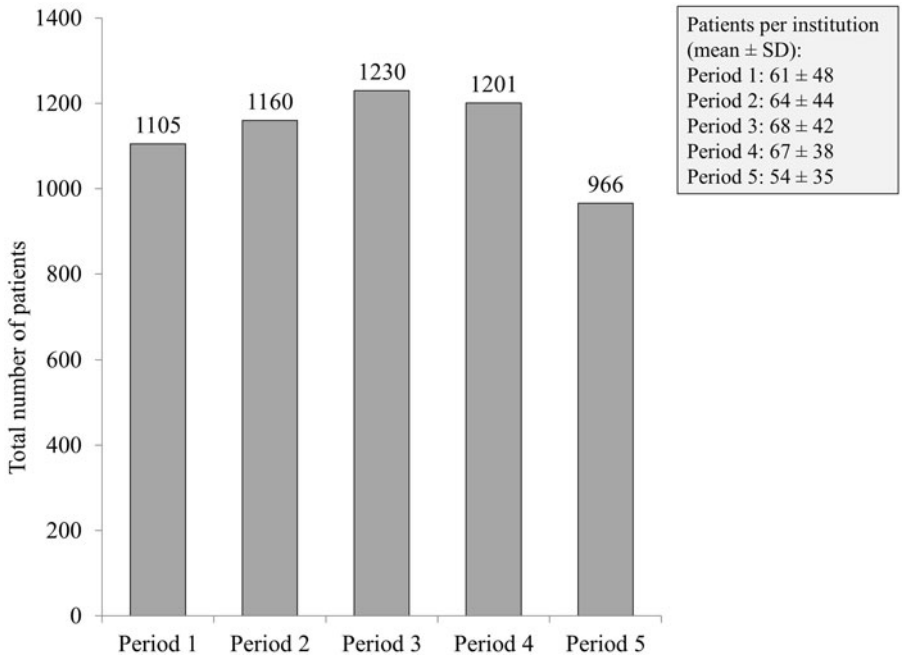

Figure 2. The number of patients that participated in the Rehabilitation, Sport and Exercise program each half year of the program period (period 1–5). *Note.* Mean and *SD* of the number of patients per institution ($n = 18$) are depicted in the top-right box.

Dosage

Institutional level

A total of five national meetings and eight regional meetings with professionals were organized. The average response rates to these national and regional meetings were respectively 87% (range: 72–100%) and 79% (range: 61–94%). Response rates to the meetings were lowest during the last year of the program period (national year 1: 97%, year 2: 83%, year 3: 72%; regional: year 1: n/a, year 2: 88%, year 3: 61%). Furthermore, 11 training courses in MI were organized, as well as 15 return-days to refresh and deepen the MI skills.

Patient level

1344 of the 1719 patients (78.2%), who participated in the ReSpAct-study, received a referral to a community-based sport or physical activity during the face-to-face consultation at the "Physical Activity Counseling Center." The total number of counseling sessions (phone and email) varied among patients (0 sessions: $N = 240$, 14.0%; 1–3 sessions: $N = 965$, 56.1%, 4 or more sessions: $N = 514$, 29.9%). A similar variation was found in the total number of counseling sessions that were received by phone (0 session: $N = 340$, 19.8%; 1–3 sessions: $N = 1077$, 62.6%, 4 or more sessions: $N = 302$, 17.6%).

Fidelity of MI

Patient level

Median + IQR of the MICAS-scores at t0 and t1 were generally high (t0: 92 + 15, $N = 1254$; t1: 92 + 16, $N = 652$) illustrating high levels of MI fidelity of received face-to-face consultation and counseling sessions from patients' perspective. The Wilcoxon signed-rank test showed that the MICAS-score of follow-up-survey was significantly lower than the baseline-survey ($Z = -5621$, $p < 0.001$, $N = 573$) indicating that MI fidelity of counseling sessions was assessed lower than the MI fidelity of the face-to-face consultations.

Satisfaction

Institutional level

At the end of the program period (T2), 45% of the professionals reported that the financial incentive was an essential factor for successful implementation. Furthermore, the training course in MI (78%) and the advisory support from national coordinators (88%) were reported to be important or essential for successful implementation (Supplementary Table S2). Other activities of the implementation strategy were mostly reported to be important, but not essential.

During the whole program period, professionals' opinion about the RSE program was positive illustrated by high mean scores on the 10-point rating scale (T0: 8.1 ± 0.7; T1: 8.0 ± 1.2; T2: 8.3 ± 0.9).

Patient level

Patients rated the received face-to-face consultation at the "Physical Activity Counseling Center" with an average of 8.1 ± 1.3 ($N = 1319$) and the counseling sessions with an average of 8.0 ± 1.6 ($N = 672$). A total of 29.1% ($N = 306$) of the patients who filled in the t1-survey reported that there was no communication with the counselors of the "Physical Activity Counseling Centers" during the last 3 months and therefore this group did not rate the counseling sessions.

Maintenance

After the program period, 16 institutions (89%) became paid member of the RSE program and therefore formally agreed to continue the "Physical Activity Counseling Center" in their institution. Furthermore, 5 months after the end of the program period a total of 34 "Physical Activity Counseling Centers" were registered by national coordinators for the RSE program.

Table 2. Characteristics of received counseling of the distinct profiles.

	Low intensive counseling ($n = 841$)	Frequent telephone counseling ($n = 749$)	Counseling as intended ($n = 113$)	Long telephone-based counseling ($n = 16$)
Number of email contacts				
0	66.0	77.2	96.5	93.8
1	12.7	21.1	3.5	6.3
2	13.1	1.7	0.0	0.0
≥3	8.2	0.0	0.0	0.0
Number of telephone contacts				
0	40.4	0.0	0.0	0.0
1	46.4	0.9	4.4	0.0
2	12.7	26.7	8.8	18.8
3	0.5	42.6	26.5	12.5
≥4	0.0	29.8	60.2	68.8
Referred to sports activity (% Yes)	78.1	80.1	66.4	75.0
Total duration of contacts (minutes, SD)	60.27 (15.90)	85.73 (15.00)	138.76 (15.47)	231.00 (32.83)

Table 3. Patients' characteristics of the distinct profiles.

	Low intensive counseling ($n = 841$)	Frequent telephone counseling ($n = 749$)	Counseling as intended ($n = 113$)
Mean age (SD)	49.05 (14.01)	50.60 (13.46)	50.47 (13.33)
Gender (% female)	54.0	53.2	51.5
Rehabilitation treatment at baseline (%)			
Inpatient	2.3	3.6	5.3
Outpatient	89.3	90.1	92.9
Medical consultation	8.4	6.3	1.8
Diagnoses (%)			
Brain disorders (e.g., stroke)	25.7	27.4	24.8
Disorders of locomotor system	19.1	18.2	16.8
Chronic pain	17.5	16.0	12.4
Neurologic disorders	14.5	12.7	23.0
Disorders of organs	10.8	12.4	10.6
Other disorders (e.g., amputation, spinal cord injury, rheumatic diseases)	12.4	13.3	12.4
Psychosocial status at baseline			
BREQ-score*	11.19 (5.46)	11.57 (5.22)	10.83 (5.15)
Self-efficacy	41.21 (11.51)	41.63 (11.50)	40.46 (11.99)
Stage of change (%)			
(Pre)contemplation	20.1	18.9	24.3
Preparation	22.8	20.9	14.0
Action	27.4	31.9	32.7
Maintenance	29.6	28.4	29.0

*The BREQ-score is a measure for motivation for engaging in an active lifestyle [30].

Profiles of received counseling and its association with physical activity outcomes

Choosing the optimal number of profiles was not straightforward because of inconsistency across model fit indices (Supplementary Table S3). Although the Bayesian Information Criterion (BIC) pointed to at least six profiles, several posterior probabilities of that model were below the minimally preferred value of 0.80, indicating less distinct profiles [33]. This was also the case in the five profile solution, and therefore, we opted for a model with four profiles as the optimal model. The largest profile ($N = 841$) was labelled "*low intensive counseling*." The second-largest ($N = 749$) was labelled "*frequent telephone counseling*." A third profile consisted of 113 participants and was characterized as "*counseling as intended*." Lastly, a very small profile ($N = 16$) was labelled "*long telephone-based counseling*."

Table 2 describes the profiles in terms of the received counseling characteristics included in the latent class analyses. They differed markedly in the total duration of the received counseling. The two smallest profiles report intensive counseling [on average 138.76 (15.47) and 231.00 (32.83) minutes] as compared to the two larger profiles [60.27 (15.90) and 85.73 (15.00) minutes]. The three largest profiles are described further in terms of personal characteristics in Table 3. No relevant differences were visible in terms of demographic, health care setting or psychosocial status at baseline.

Descriptive of physical activity outcomes (total minutes per week and sport participation) during and after rehabilitation are presented in Table 4. In all profiles, the total minutes of physical activity and percentage of patients participating in sports increased after rehabilitation. Results of the associations between the profiles and changes in physical activity outcomes are also presented in Table 4. The interaction terms in the crude and adjusted models of both physical activity outcomes were non-significant, indicating that the associations between profile membership and changes in physical activity outcomes were not different at different time points. The physical activity and sport participation outcomes showed no significant differences between the profiles in both the crude and the adjusted models and odds ratios approached 1.00.

Discussion

This study demonstrated that after a three-year program period, the "Physical Activity Counseling Centers" were sustainably implemented in Dutch rehabilitation care. The multifaceted implementation strategy, including financial incentives, intensive MI training courses and advisory support, might have contributed to these successful and promising findings. The positive experiences from both professionals and patients as well as patients' increased physical activity levels after rehabilitation show that "Physical

Table 4. Physical activity outcomes during (T0) and after (T1) rehabilitation presented per profile and results of the multilevel analyses.

	Descriptive		Multilevel models	
Physical activity outcomes	T0	T1	Crude	Adjusted
Total minutes per week physical activity	Median (IQR)	Median (IQR)	Beta (95% CI)	Beta (95% CI)
Profiles*				
Low intensive counseling	1881 (1638)	2156 (1775)		
Frequent telephone counselling	1817 (1650)	1954 (1830)	−91.2 (−2.5 to 47.2)	−57.0 (−197.6 to 83.7)
Counseling as intended	1727 (1553)	2089 (2009)	−139.6 (−412.6 to 133.5)	−65.8 (−341.6 to 210.0)
Sport participation	Percentage (yes)	Percentage (yes)	Odds ratio (95% CI)	Odds ratio (95% CI)
Profiles*				
Low intensive counseling	54.7	61.4		
Frequent telephone counseling	54.8	66.4	1.01 (0.82 to 1.25)	0.94 (0.36 to 2.46)
Counseling as intended	58.5	65.9	1.01 (0.80 to 1.26)	0.84 (0.53 to 1.33)

*The low intensive counseling profile was used as reference group in the multilevel models. The crude models included interaction terms with time and the adjusted models included also a correction for gender, age, treatment setting, self-efficacy levels at baseline and motivation levels at baseline. Descriptive information of the physical activity outcomes were based on complete case analyses.

Activity Counseling Centers" are a promising strategy in the connection of rehabilitation care and community-based physical activities [34,35].

Reach

The number of participants (reach) as well as the response rates to the regional meetings was highest halfway the program period suggesting a decline in engagement levels of professionals in the last year of the program period. The phenomenon that implementation levels decrease over time has been reported in previous evaluations on implementation processes of health promotion programs [36,37]. The decrease in implementation levels has been described to be the result of a decrease in professionals' engagement in program implementation. However, the stable high satisfaction rates of the professionals and the fact that almost all institutions were willing to continue the RSE program suggest that decreased engagement is not an issue by itself, and thus cannot explain the decreasing number of participants in the current study completely. Another explanation might be that in the last year of the program period several institutional changes occurred, such as staff turnovers (e.g., new manager or new project leader) and reorganizations. These institutional changes, illustrated as the "implementation determinants" in the theoretical framework [18], can hamper the implementation process substantially [15,38].

Although the results showed a decrease in the number of participants, a heterogeneous group of patients received tailored support via a "Physical Activity Counseling Center." These findings (Supplementary Table S4) illustrate that the "Physical Activity Counseling Centers" are accessible for people with a variety of chronic diseases and/or physical disabilities of all ages, including adolescents. This is in line with the general idea that physical activity is vital for almost all disabled populations [1,39,40], which makes implementing "Physical Activity Counseling Centers" a promising "disability-overarching" strategy to promote an active lifestyle after rehabilitation.

The implementation strategy (reach, dosage, fidelity in MI)

According to a large number of professionals involved in the current study, the financial incentives, the training courses in MI, and the advisory support from national coordinators seem important or essential elements for successful implementation of the RSE program (Supplementary Table S2). The use of MI in health promotion programs in order to establish a behavioral change has increased substantially in the last decades [27,41–43] illustrating its potential effectiveness among different groups of patients. However, the quality of MI application (i.e., MI fidelity) has been mentioned to be an important factor to successfully realizing a behavioral change [44]. In the current study, patients assessed MI fidelity with consistently high scores, using the MICAS questionnaire [28]. These high scores may be explained by the fact that the counselors of the current study received a relatively intensive MI training course of a professional MI trainer including several refresher meetings. The duration of MI training courses ($\gg$24 h) provided in our study was also more intensive compared to most MI training courses described in other papers (most studies: 9–16 h) [45,46]. Based on our positive and promising – although subjective – findings regarding MI fidelity, we recommend others who are planning to provide physical activity counseling after rehabilitation to invest in high quality intensive MI training courses including several refresher training sessions.

Sustainability of "physical activity counseling centers" (maintenance)

Several authors highlighted the need to not only pay attention to the implementation process of a program in daily practice, but also to its sustainability after the implementation period [47,48]. The sustainability of the "Physical Activity Counseling Centers" is promising and shows interesting results from both an implementation perspective and rehabilitation practice. After the program period, rehabilitation institutions were provided with the opportunity to become a paid member to continue the RSE program in their institution. An interesting finding was that almost all institutions (89%) were willing to pay for the continuation, and the number of "Physical Activity Counseling Centers" further increased. The possible reason behind this success is the intensive implementation strategy including both active (e.g., meetings, training courses) and more passive activities (e.g., financial incentives). During the three-year period, rehabilitation professionals were actively supported and motivated which gave the opportunity to experience the added value of the "Physical Activity Counseling Center" in rehabilitation care [34]. As a result of their positive experiences, it is possible that the professionals became internally motivated to continue the RSE program. Moreover, the national coordinators were able to create a culture in Dutch rehabilitation care in which rehabilitation professionals believe in the idea to integrate physical activity promotion in Dutch rehabilitation care and experienced the need to collaborate with each other on national-level [34]. A paid membership on the RSE program in which institutions have to pay the program owners became a successful solution not only to continue the "Physical

Activity Counseling Centers," but also to continue this nationwide collaboration between rehabilitation institutions. At the same time, this gives the opportunity to monitor whether the RSE program is continued with acceptable implementation levels.

Diversity of received counseling

The received counseling was diverse as illustrated by the constructed profiles. Interestingly, the "counseling as intended" profile included only 6.6% ($N = 113$) of the patients indicating that the majority of the patients did not receive counseling according to the original protocol (i.e., four telephone-based sessions) [10,11]. Such deviations from the protocol are not uncommon in "real-world" settings [49], since some changes are often made when implementing the program in different settings and under different circumstances [34]. Furthermore, studies have also highlighted the need to use individually tailored strategies in promoting physical activity [50] and our results are in line with these findings, although we have no data available on whether the differences in counseling was due to active tailoring. This may be an interesting topic for further research.

Furthermore, we were unable to demonstrate differences between received counseling profiles and changes in patients' physical activity levels during and immediately after rehabilitation. Our results are (partly) in contrast with a previous review suggesting that more intensive telephone-based counseling is associated with better behavioral outcomes [51]. Another recent study showed that both dose and content of a physical activity counseling program are essential elements for changing physical activity behavior in people with spinal cord injury [49]. We did not include qualitative characteristics (e.g., MI-skills, content of sessions, counselors-patient alliance) in the construction of the profiles. The fact that we did not study elements of the content of the counseling sessions may explain why we were unable to find large differences in physical activity outcomes between the profiles of received counseling.

Although the change in physical activity level was not associated with received counseling profiles, patients' physical activity levels increased after rehabilitation, which is a promising finding in terms of achieved program outcomes. The total minutes of physical activity level reported by participants in our study are relatively high (medians from 1727–1881 to 1954–2156), but comparable with physical activity levels reported in other studies using the original SQUASH questionnaire reporting on total minutes physical activity per week [52–55]. We are currently conducting additional analyses to provide more details on what type of physical activity patients participate in and what the associated perceived intensities are. Using the physical activity data collected within the ReSpAct-study on both short and long term (up to 6 years after rehabilitation), we hope we will gain better understanding of (the variation in) physical activity behavior among people with physical disabilities and/or chronic diseases during and after rehabilitation.

Another positive finding is that a majority of the patients (78%) was referred from the "Physical Activity Counseling Center" to a sport or physical activity facility in the community. This finding in addition with findings from our previous studies [34,35] illustrate that a connection was established between rehabilitation care and community-based sports and physical activities. Moreover, the percentage of patients participating in sports by themselves was increased from baseline to follow-up (55–60% to 62–65%).

Our findings suggest that the adaptations that were applied within the counseling program did not notably influence the changes in patients' physical activity level on the short term. In other words, similar physical activity outcomes were achieved regardless of the counseling protocol intensity. The importance to provide patients with physical activity counseling *after* rehabilitation is also already supported by previous studies [6,9]. A recent systematic review of review papers identified key factors influencing physical activity behavior in disabled populations [4]. The authors identified factors related to different levels (intrapersonal, interpersonal, institutional, community, and policy) based on a social-ecological model [56]. As illustrated in this study, the concept of establishing "Physical Activity Counseling Centers" in rehabilitation care is for several reasons a promising approach for patients to maintain an active lifestyle on both the short and longer term [4]. First, the use of MI may help to overcome patient's barriers on intrapersonal (e.g., psychological factors) and interpersonal (e.g., social support) level [27]. Furthermore, the existence of "Physical Activity Counseling Centers" in rehabilitation institutions with well-trained and skilled rehabilitation professionals address key factors on institutional (e.g., information during rehabilitation treatment, knowledge of professionals) and community level (e.g., collaborations). Although these inter-sectoral collaborations might be one of the successful elements of promoting physical activity in people with disabilities, it can be a challenge to establish and maintain these collaborations due to lack of time and/or differences in cultures and interests between sectors [57–59]. The counselors in the "Physical Activity Counseling Centers" may play a promising role in overcoming these challenges and therefore creating and maintaining a sustainable network between rehabilitation and community-based physical activity [9,60].

Strengths and limitations

A major strength of this study is the multicenter and longitudinal design. Institutions situated across the whole country were involved in this study illustrating the nationwide approach resulting in a unique database of national, institutional and patient level information collected from different sources. Another strength is the independent roles of the researchers in the program's evaluation, minimizing bias in the outcome variables and interpretations. Studies have demonstrated indications that researchers who have dual roles, for example because they are also involved as program developer, program owner or are colleagues of program owners, are associated with more positive outcomes of the evaluation study compared to studies by independent researchers [61,62]. Furthermore, this study focused not only on the implementation of the program but also on its sustainability. We were even able to include data measured 5 months post-implementation. In addition, this multilevel study reports on the process evaluation from both the institutional level and the patient level.

There are also some limitations that need to be discussed. The first limitation concerns the quality of the data of the registration system that was used to assess the reach and dose. Counselors were expected to register every patient in this system. It is possible that counselors forgot to register some patients, which might have resulted in lower numbers of registered participants. However, the registration system was also developed as a tool for counselor's own administration and we have no indication that counselors selectively registered data into the system. The second limitation relates to the received counseling sessions is that we did not distinguish between sessions that did not take place

because the patient could not be reached or because the counselor did not contact the patient. The third limitation relates to the percentage of patients that was reached by the RSE program. It appeared that institutions had difficulties with providing information on the total number of patients that received rehabilitation treatment within their institution (de-nominator). Therefore, we could only calculate the percentage of patients reached by the RSE program for 10 institutions instead of 18 institutions.

Another limitation that needs to be addressed relates to the MI fidelity outcome. For feasibility reasons, we measured MI fidelity using a survey completed by patients instead of using audio-recordings of the consultations. For future studies, we recommend measuring fidelity of the consultations using a random sample of audio-recordings, which would provide the opportunity to gain additional insights on counselors' MI-skills, the content of the counseling sessions and the counselor-patient alliance.

This study is conducted in Dutch rehabilitation care, which might be organized differently compared to other countries. In this respect, the Netherlands is a relatively small country with a high population density which might not only be a facilitating factor for nationwide collaboration between rehabilitation institutions, but also for creating and maintaining local inter-sectoral collaborations. Although this study is conducted under specific Dutch circumstances, the findings of this study may inspire other countries to establish or optimize the connection between rehabilitation care and community-based physical activity.

Practice implications

The concept to establish "Physical Activity Counseling Centers" for disabled populations might not only be applicable for rehabilitation care, but is also a feasible approach for other settings, such as primary care, physiotherapy practice or community centers. For successful implementation in other settings and/or in other countries, adaptations to the physical activity counseling program might be necessary. For example, almost all counselors were also involved as a sport therapist or physiotherapist in patient's rehabilitation treatment indicating that they have knowledge about and experience with physical activity in people with disabilities. When implementing a "Physical Activity Counseling Center" in other settings, special attention should be given to the knowledge and skills of the counselors [4]. It is important that they have sufficient knowledge about physical activity promotion in disabled populations, but they should also know which sport and exercise facilities in the community are accessible for people in disabilities. Also, these counselors should be trained in MI.

Conclusions

This study demonstrated that after a three-year program period, "Physical Activity Counseling Centers" were sustainably implemented in Dutch rehabilitation care. The positive experiences from professionals and patients show that establishing "Physical Activity Counseling Centers" is a promising strategy to connect rehabilitation care and community-based physical activity [34,35]. Although there was large variation in the actual received counseling, this did not coincide with large differences in physical activity outcomes suggesting opportunities to further optimize tailored counseling for people with disabilities. This study illustrated an innovative approach to assess heterogeneity in implementation outcomes (e.g., profiles of received counseling) in relation to program outcomes (e.g., physical activity) on the patient level.

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